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Foreword: cellular automata and applications

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This special issue contains four papers presented during the workshop, "18th International Workshop on Cellular Automata and Discrete Complex Systems" (Automata 2012), held in La Marana, Corsica island (France) in the period September 19–21th, 2012.

The aim of this workshop is to establish and maintain a permanent, international, multidisciplinary forum for the collaboration of researchers in the field of Cellular Automata (CA) and Discrete Complex Systems (DCS), provide a platform for presenting and discussing new ideas and results, and support the development of theory and applications of CA and DCS.

Typical, but not exclusive, topics of the workshop are: dynamics aspects, algorithmic, computational and complexity issues, emergent properties, formal language processing, models of parallelism and distributed systems, phenomenological descriptions, scientific modeling and practical applications.

After an additional review process, four papers were selected and included in this special issue. They are now presented in an extended and improved form with respect to the already refereed workshop version that appeared in the proceedings of Automata 2012.

The paper "Computation of Functions on n Bits by Asynchronous Clocking Cellular Automata" by Michael Vielhaber aims at proving that different functions on binary vectors can be computed by changing the updating scheme from a fully synchronous to an asynchronous one on some fixed CA local rule.

In their paper "Solving the Parity Problem in One–Dimensional Cellular Automata", Heather Betel, Pedro P. B. de Oliveira, and Paola Flocchini deal with the parity problem in one–dimensional cellular automata (CA): a CA local rule solves the parity problem if, starting from any initial configuration, the CA converges to the 0–configuration (resp., the 1–configuration) if and only if the initial configuration contains an even number of 1s (resp., an odd number of 1s). In particular, authors focus on the neighborhood size of CA rules solving the problem.

Murillo G. Carneiro and Gina M. B. Oliveira present in the paper "Synchronous Cellular Automata-Based Scheduler initialized by Heuristic and modeled by a Pseudo-linear neighborhood" two approaches based on CA to the task scheduling problem in multiprocessor systems.

The implementation of cellular automata on processor arrays is considered by Jean-Vivien Millo and Robert de Simone in the paper "Explicit routing schemes for implementation of cellular automata on processor arrays". They deal with the trade-offs between the generality of the CA neighborhood and the limited expressive power provided by physical platforms. This is an extremely hot topic which will help in turning CA towards real extended applications.

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